c. In this case also the opposition of the laws is sufficiently well marked; the only divergence from opposition being that due to the minor minimum about the meridian of 19^h, due, it is believed, as noted 7th *c*, to the partial combination of opposite laws in the aphelion half-year.

9th. It will be observed that the variations of the law with reference to the moon's declination *for any given period of the year*, consists chiefly in the difference of the relative values of the maxima and minima, the differences of epochs being small. Thus for perihelion, the moon furthest north, the principal maximum occurs at the inferior passage; the moon on the equator going south, the two maxima are nearly equal; the moon furthest south, the maximum at the superior passage is by far the greatest: on the equator going north, the two maxima are again nearly equal; and so on for other epochs.

10th. The moon's action is chiefly, if not wholly, dependent on the position of the sun, or (which is the same thing) on the position of the earth relatively to the sun; and the law of the lunar action at the magnetic equator resembles in some points that for the solar action at the same epochs. Thus about aphelion there is a *minimum* of easterly (maximum of westerly) declination produced by the lunar action, as well as by the solar action, for these two bodies near the superior meridian; whereas about perihelion both actions for the sun and moon near the superior meridian produce *maxima* of easterly declination. A like analogy holds for near the epochs of sunrise and moonrise.

III. Postscript to a Paper "On Compound Colours, and on the Relations of the Colours of the Spectrum." By J. Clerk Maxwell, Esq. Communicated by Professor Stokes, Sec. R.S. Received May 8, 1860.

(Abstract.)

Account of Experiments on the Spectrum as seen by the Colour-blind.

The instrument used in these observations was similar to that already described. By reflecting the light back through the prisms by means of a concave mirror, the instrument is rendered much shorter and more portable, while the definition of the spectrum is

rather improved. The experiments were made by two colour-blind observers, one of whom, however, did not obtain sunlight at the time of observation. The other obtained results, both with cloud-light and sun-light, in the way already described. It appears from these observations—

I. That any two colours of the spectrum, on opposite sides of the line "F," may be combined in such proportions as to form white.

II. That all the colours on the more refrangible side of F appear to the colour-blind "blue," and all those on the less refrangible side appear to them of another colour, which they generally speak of as "yellow," though the green at E appears to them as good a representative of that colour as any other part of the spectrum.

III. That the parts of the spectrum from A to E differ only in intensity, and not in colour; the light being too faint for good experiments between A and D, but not distinguishable in colour from E reduced to the same intensity. The *maximum* is about $\frac{2}{3}$ from D towards E.

IV. Between E and F the colour appears to vary from the pure "yellow" of E to a "neutral tint" near F, which cannot be distinguished from white when looked at steadily.

V. At F the blue and the "yellow" element of colour are in equilibrium, and at this part of the spectrum the same blindness of the central spot of the eye is found in the colour-blind that has been already observed in the normal eye, so that the brightness of the spectrum appears decidedly less at F than on either side of that line; and when a large portion of the retina is illuminated with the light of this part of the spectrum, the *limbus luteus* appears as a dark spot, moving with the movements of the eye. The observer has not yet been able to distinguish Haidinger's "brushes" while observing polarized light of this colour, in which they are very conspicuous to the author.

VI. Between F and a point $\frac{1}{3}$ from F towards G, the colour appears to vary from the neutral tint to pure blue, while the brightness increases, and reaches a maximum at $\frac{3}{5}$ from F towards G, and then diminishes towards the more refrangible end of the spectrum, the purity of the colour being apparently the same throughout.

VII. The theory of colour-blind vision being "*dichromic*," is confirmed by these experiments, the results of which agree with those

obtained already by normal or "*trichromic*" eyes, if we suppose the "red" element of colour eliminated, and the "green" and "blue" elements left as they were, so that the "*red-making rays*," though dimly visible to the dichromic eye, excite the sensation not of red but of green, or as they call it, "yellow."

VIII. The extreme red ray of the spectrum appears to be a sufficiently good representative of the defective element in the colour-blind. When the ordinary eye receives this ray, it experiences the sensation of which the dichromic eye is incapable; and when the dichromic eye receives it, the luminous effect is probably of the same kind as that observed by Helmholtz in the ultra-violet part of the spectrum—a sensibility to light, without much appreciation of colour.

A set of observations of coloured papers by the same dichromic observer was then compared with a set of observations of the same papers by the author, and it was found—

1. That the colour-blind observations were consistent among themselves, on the hypothesis of *two* elements of colour.

2. That the colour-blind observations were consistent with the author's observations, on the hypothesis that the two elements of colour in dichromic vision are identical with two of the three elements of colour in normal vision.

3. That the element of colour, by which the two types of vision differ, is a red, whose relations to vermilion, ultramarine, and emerald-green are expressed by the equation

$$D = 1{\cdot}198V + 0{\cdot}078U - 0{\cdot}276G,$$

where D is the defective element, and V, U and G the three colours named above.

IV. "Report to the Royal Society of the Expedition into the Kingdom of Naples to investigate the circumstances of the Earthquake of the 16th December 1857." By Robert Mallet, Esq., C.E., F.R.S.

(Abstract.)

The region examined in this expedition, embraces, in its widest extent, most of the country between a line drawn from Terracina to Gargano on the north, down to the Gulf of Tarentum on the south.